REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 1 and 3-7 are currently pending in this application. No new matter has been added by way of the present amendment. For instance, the amendment to claim 1 is supported by the Specification at, for example, paragraph [0022], as well as Figures 2(a) and 2(b). Accordingly, no new matter has been added.

In view of the amendments and remarks herein, Applicants respectfully request that the Examiner withdraw all outstanding rejections and allow the currently pending claims.

Substance of Interview

Applicants thank the Examiner for the time, helpfulness and courtesies extended to Applicants' representative during the Interview of July 28, 2009. The assistance of the Examiner in advancing prosecution of the present application is greatly appreciated.

In compliance with M.P.E.P. § 713.04, Applicants submit the following remarks.

The outstanding rejection of the claims under 35 U.S.C. 103(a) was discussed. Applicants reaffirmed their previous position that the prior art of record fails to teach or suggest every aspect of the present invention. Various ways of addressing the prior art rejection were discussed, and suggestions were discussed that may be drafted to cover particular aspects of the invention as not described by the prior art.

Issues Under 35 U.S.C. 103(a)

AAPA in view of Gurary '183

Claims 1 and 3-7 stand rejected under 35 U.S.C. 103(a) as being obvious over Applicants' admitted prior art ("AAPA") in view of Gurary et al. (U.S. 6,001,183) (hereinafter Gurary '183). Applicants respectfully traverse.

The Examiner asserts that AAPA teaches all the limitations of the present claims, except for "a recess portion depressed in a dome shape at a back side of the wafer containing member so that an apex of the dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of the heating uniformizing member." The Examiner relies on the teachings of Gurary '183 to overcome this deficiency.

The Examiner asserts that Gurary '183 teaches a deposition apparatus comprising a heating assembly, a wafer containing member and a susceptor or uniformizing member. The Examiner further asserts that Gurary '183 teaches that, by optimizing the gap and the thickness of the material at the wafer holding member or the susceptor, thermal conductivity can be controlled to compensate for non-uniformity caused by non-uniform heat transfer. Moreover, the Examiner notes that, with regards to the shape of the gap, "one of ordinary skill in the art would find a dome shaped gap appropriate for temperature uniformity at the surface of the substrate."

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, there must be a reason why one of ordinary skill in the art would modify the reference or combine reference teachings to obtain the

invention. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co. v Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). There must be a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* The Supreme Court of the United States has recently held that the "teaching, suggestion, motivation test" is a valid test for obviousness, albeit one which cannot be too rigidly applied. *Id.* Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rationale underpinning to support the legal conclusion of obviousness. *KSR Int'l Co. v Teleflex Inc.*

The vapor phase growth apparatus of the present invention comprises a wafer containing member installed within the reactor and having a plurality of wafer mounting portions along the same circumference on a front surface thereof for holding a plurality of wafers. In the present vapor phase apparatus, a recess portion depressed in a dome shape is formed at a back surface of the wafer containing member, and the recess portion is formed so that an apex of the dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of the heating uniformizing member.

Distinctions between the present invention, AAPA and Gurary '183 have been placed before the Examiner in the past (see, for example, Response to Office Action filed on January 30, 2009). Applicants reaffirm their previous position that neither AAPA nor Gurary '183, alone or in combination, teach or suggest each and every limitation of the present invention.

The Examiner argues that wafer carriers 1100, 1200 and 1300 of Gurary '183 correspond to the wafer containing member of the present invention (see Figs. 14, 15 and 16). Applicants

respectfully disagree.

In the present invention, the above described recess portion depressed in a dome shape is formed at a back surface of the wafer containing member in order to achieve good temperature distribution uniformity in the wafer containing member (including the wafers). The wafer containing member is structured so as to hold a plurality of wafers in the plurality of wafer mounting portions formed along the same circumference on the front surface of the wafer containing member.

In stark contrast, wafer carriers 1100, 1200 and 1300 of Gurary '183 exhibit the typical structure obtained when a wafer is placed on a wafer carrier. When a wafer is placed on a wafer carrier, the central portion of the wafer carrier is positioned above the portion where the susceptor (heat uniformizing member) connects with the spindle. Therefore, the existence of the spindle affects the heat conductivity in the wafer carrier and the temperature distribution of the wafer surface, such that the spindle draws heat away from the center portion of the susceptor, as the spindle is not itself heated (see col. 12, lines 13 to 15 in Gurary '183). In order to compensate for the non-uniformity of the temperature distribution on the wafer surface caused by the existence of the spindle, gap 1139, gap 1245 and bore 1310 are respectively formed. Moreover, the central portion of the wafer carrier is made so as to be thicker than the portions where the gap 1139, the gap 1245 and the bore 1310 are formed. As a result, a uniform temperature distribution on the wafer surface is achieved by increasing the heat conductivity at the portion positioned above the spindle of the wafer carrier.

When the apparatus of Gurary '183 (in which the heat conductivity is increased at the central portion of the wafer carrier) is combined with that of AAPA (in which the temperature at

the central portion of the wafer containing member surface is higher than the temperature of the edge portion of the wafer containing member surface), the heat conductivity at the portion of the wafer containing member which positions above the spindle (i.e., the central portion of the wafer containing member) increases. As a result, the temperature of the central portion of the wafer containing member **becomes higher** than that at the edge portion of the wafer containing member surface (emphasis added).

In the present invention, the temperature difference between the central portion and the edge portion of the wafer containing member surface **is reduced** and the temperature distribution in the wafer surface is made uniform by reducing the heat conductivity at the central portion of the wafer containing member and forming a space in a dome shape at the back surface of the wafer containing member (emphasis added). This overcomes the temperature distribution problems associated with the prior art (i.e., the temperature of the central portion of the wafer containing member surface becomes higher than the temperature at the edge portion of the wafer containing member surface). Applicants respectfully submit that the present invention cannot be obtained by combining the teachings of AAPA and Gurary '183.

Evidently, the cited references, alone or in combination, fail to teach or suggest a vapor phase growth apparatus as claimed. For this reason alone, this rejection should be withdrawn. Moreover, Applicants submit that the present invention achieves superior and unexpected results by specifically forming a recess portion in a dome shape (as opposed to other shapes) at the back surface of the wafer containing member, so as to provide a space between the wafer containing member and the heat uniformizing member.

The Examiner's attention is respectfully directed to the enclosed Declaration Under 37 C.F.R. 1.132 (executed version to follow). As shown therein, Applicants have been able to achieve a temperature difference between the central portion and the edge portion at the surface of the wafer containing member of 5°C or less. Applicants have also been able to achieve a temperature distribution within the surface of a wafer of 1°C or less. In comparison, prior art apparatuses and techniques achieve a temperature distribution within the surface of the wafer of about 9°C.

In view of the above, reconsideration and withdrawal of this rejection are respectfully requested.

AAPA in view of Yoshiyuki '901

Claims 1 and 3-7 stand rejected under 35 U.S.C. 103(a) as being obvious over Applicants' admitted prior art ("AAPA") in view of Yoshiyuki Kamata et al. (JP 06124901) (hereinafter Yoshiyuki '901) as evidenced by Eiichi Shimizu (WO 2003/107403) (hereinafter WO '403). Applicants respectfully traverse.

The Examiner asserts that AAPA teaches all the limitations of the present claims, except for "a recess portion depressed in a dome shape at a back of the wafer containing member so that an apex of the dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of the heating uniformizing member." The Examiner, however, relies on the teachings of Yoshiyuki '901 and WO '403 in an attempt to overcome these deficiencies.

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. Distinctions between the present invention, Yoshiyuki '901 and WO '403 have been placed before the Examiner in the past (see Response to Office Action filed on July 11, 2008). Applicants submit the following additional comments.

As previously noted, Yoshiyuki '901 fails to teach or suggest a vapor phase growth apparatus as claimed, comprising a sealable reactor, a wafer containing member having a wafer mounting portion, a gas supply member, a heating member and a heat uniformizing member, wherein a recess portion is formed at a back side of the wafer containing member so that an apex of the dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of the heating uniformizing member. WO '403 fails to cure the deficiencies of Yoshiyuki '901, as it also fails to teach or suggest a vapor phase growth apparatus as claimed.

Moreover, Applicants submit that one skilled in the art would not have been motivated to combine and modify the references as proposed by the Examiner. The objective of Yoshiyuki '901 is to form a compound semiconductor thin film in which the in-plane composition varies. At the surface of the semiconductor substrate on which the compound semiconductor thin film grows, the growth temperature is controlled so as to vary based on location, by providing a space between the heating element and the quartz spacer. The composition of the compound-semiconductor thin film to be grown is determined by the growth temperature. The in-plane composition varies in the grown thin film.

FIG. 10 of Yoshiyuki '901 discloses a quartz spacer in which a recess portion in a dome shape is formed at the back surface thereof. However, Applicants submit that it appears that the

English machine translation of Yoshiyuki '901 is inconsistent with the disclosure in the original Japanese document. At col. 7, lines 20-22 of the original document, Yoshiyuki '901 discloses that "the surface temperature of the substrate shows a distribution corresponding to the shape of the dome-shaped space. Thus, the composition of the compound semiconductor thin film which grows on the substrate also varies so as to correspond to the temperature" (enclosed herewith is a certified translation of the relevant portions of Yoshiyuki '901).

Evidently, Yoshiyuki '901 teaches that the dome-shaped space is formed at the back surface of the quartz spacer **in order to make the temperature non-uniform**, so as to correspond to the shape of the dome-shaped space, in order to manufacture a compound semiconductor thin film in which the in-plane composition varies (emphasis added).

In contrast, WO '403 discloses the formation of a wafer containing member by using a material having heat conductivity similar to the heat conductivity of the wafer placed on the wafer containing member, **in order to maintain the temperature distribution uniform** within the surface of the wafer (emphasis added.

Evidently, the objectives of these references are opposite to one another, and attempting to combine their teachings would render them inoperative for their intended purposes.

In view of the above, reconsideration and withdrawal of this rejection are respectfully requested.

AAPA in view of Bader '790

Claims 1 and 3-7 stand rejected under 35 U.S.C. 103(a) as being obvious over Applicants' admitted prior art ("AAPA") in view of Bader et al. (U.S. 2004/0187790) (hereinafter Bader '790). Applicants respectfully traverse.

Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness. As amended, the present invention is directed to a vapor phase growth apparatus comprising a wafer containing member having a plurality of wafer mounting portions along the same circumference on a front surface for holding a plurality of wafers. In the presently claimed apparatus, a recess portion depressed in a dome shape is formed at a back surface of the wafer containing member. As a result, a space filled with gas having low heat conductivity is formed between the wafer containing member and the heat uniformizing member. The heat transmission efficiency is reduced closer to the central portion of the dome-shaped recess portion where the space becomes larger. Thus, in the present invention, the temperature difference between the central portion and the edge portion of the wafer containing member can be reduced. Moreover, because the temperature throughout the entire surface of the wafer becomes uniform, a thin film having good uniformity can be obtained.

Bader '790 merely discloses a space formed in the front surface of a substrate holder. However, Bader '790 does not disclose a wafer containing member in which a recess portion depressed in a dome shape is formed at a back surface of the wafer containing member, as presently claimed.

Because the invention, as set forth in Applicants' claims, is not disclosed or made obvious by the cited prior art, reconsideration and withdrawal of this rejection are respectfully requested.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and objections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Vanessa Perez-Ramos, Reg. No. 61,158, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

By _____

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Enclosure: Declaration Under 37 C.F.R. 1.132 (executed version to follow)
Certified translation of excerpt from JP 06124901

MSW/VP/sh